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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/019,201

12/20/2001

Kazuhiro Maeno

TIC-0010

9902

7590

05/06/2004

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EXAMINER

CHU, CHRIS C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 05/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicati n No.

10/019,201

Applicant(s)

MAENO ET AL.

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 - 10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment filed on September 11, 2003 has been received and entered in the case.

### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities: In claim 1, line 9, "or wiring pattern" [sic: or a wiring pattern]. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 – 4 and 6 – 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Iwasa et al. '040.

Regarding claim 1, Iwasa et al. discloses in e.g., Fig. 15, Fig. 16 and column 1, line 61 - column 2, line 47 a semiconductor device (100), comprising:

- a plurality of semiconductor elements (switching elements; column 2, lines 32 – 33) arranged on a substrate (HS); and
- a main current electrode (M1 or M2), which is formed by a piece of metal (indicates by the designation M1 or M2), which is arranged near said plurality

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of semiconductor elements and vertically apart from the surface of the substrate, wherein;

- each of said plurality of semiconductor elements (switching elements) and said main current electrode are electrically connected, and
- wherein said main current electrode bridges from one end of the substrate to an opposite end of the substrate (because the length M1 or M2 from one end-curved portion to the other end-curved portion is bigger than one end of the element HS to an opposite end of the element HS) and is arranged immediately above one of said plurality of semiconductor elements (switching elements) or a wiring pattern (wiring patterns on BS) connected to the one of said plurality of semiconductor elements.

Regarding claim 2, Iwasa et al. discloses in e.g., Fig. 15 and column 1, line 61 - column 2, line 47 each of said plurality of semiconductor elements and said main current electrode being connected by wire bonding (wires; see e.g., Fig. 15).

Regarding claim 3, Iwasa et al. discloses in e.g., Fig. 16 and column 1, line 61 - column 2, line 47 the plurality of semiconductor elements being switching elements (column 2, lines 32 – 33).

Regarding claim 4, Iwasa et al. discloses in e.g., Fig. 16 and column 1, line 61 - column 2, line 47 a thermal conductor member (BS) at a bottom of the semiconductor device, wherein said plurality of semiconductor elements are directly or indirectly connected to said thermal conductor member so that they are thermally coupled.

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Regarding claim 6, Iwasa et al. discloses in e.g., Fig. 16 and column 1, line 61 - column 2, line 47 said plurality of semiconductor elements being arranged in one row or a plurality of rows.

Regarding claim 7, Iwasa et al. discloses in e.g., Fig. 15, Fig. 16 and column 1, line 61 - column 2, line 47 a semiconductor device (100) including one or a plurality of semiconductor elements (switching elements; column 2, lines 32 – 33), comprising:

- a substrate (HS) on which the one or the plurality of semiconductor elements are arranged;
- a case (CS) that is arranged in a predetermined position relative to said substrate so that one of the plurality of semiconductor elements are surrounded; and
- a metal member (the curved portion or mid-portion of the M1 or M2) on which a main current electrode (M1 or M2) of the one of the plurality of semiconductor elements and a terminal (the foot portions that is part of the elements M1 and M2 and connected to the wiring patterns on the BS) for electrically connecting said semiconductor device and a circuit external to said semiconductor device are formed integrally,
- wherein said metal member (indicated by the designation M1 or M2) is arranged in a position apart from said substrate by using said case without directly contacting said substrate, and wherein said metal member bridges from one end of the substrate to an opposite end of the substrate (because the length M1 or M2 from one end-curved portion to the other end-curved portion

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is bigger than one end of the element HS to an opposite end of the element HS).

Regarding claim 8, Iwasa et al. discloses in e.g., Fig. 16 and column 1, line 61 - column 2, line 47 said metal member being arranged above the one or the plurality of semiconductor elements or a wiring pattern connected to the one or the plurality of semiconductor elements.

Regarding claim 9, Iwasa et al. discloses in e.g., Fig. 15, Fig. 16 and column 1, line 61 - column 2, line 47 said metal member and the semiconductor device being electrically connected by wire bonding (wires).

Regarding claim 10, Iwasa et al. discloses in e.g., Fig. 15, Fig. 16 and column 1, line 61 - column 2, line 47 said case (CS) including a frame portion surrounding the one or the plurality of semiconductor elements; and said metal member is fixed to the frame portion of said case.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasa et al. and Masumoto et al. as applied to claim 4 above, and further in view of Noro et al. '337.

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Sugawara et al. discloses the claimed invention except for the material of the thermal conductor member being formed with a ceramic material. However, Noro et al. teaches in column 3, lines 23 – 25 the material of a thermal conductor member being formed with a ceramic material. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Iwasa et al. by using the ceramic material for the thermal conductor member as taught by Noro et al. The ordinary artisan would have been motivated to further modify Iwasa et al. in the manner described above for at least the purpose of providing good connections and packages for the LSI chips in a high density and shortening the total wiring length of wirings (column 3, lines 28 – 32).

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1 and 7 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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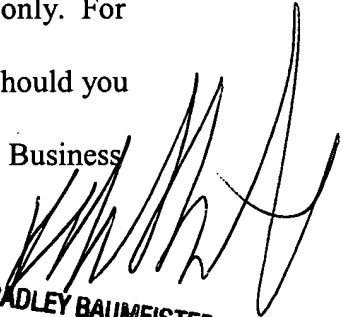
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu  
Examiner  
Art Unit 2815

  
**BRADLEY BAUMEISTER**  
**PRIMARY EXAMINER**

c.c.  
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